COLORADO RIVER RECOVERY PROGRAM Project No.: 22 1
FY-2004/2005 PROPOSED SCOPE-OF-WORK for:

Population estimate of humpback chub in Cataract Canyon

Lead Agency: Utah Division of Wildlife
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Category:
X Ongoing project
___ Ongoing-revised project
___ Requested new project
___ Unsolicited proposal

Expected Funding Source:
X Annual funds
___ Capital funds
___ Other (explain)

I. Title of Proposal:

Population estimate of humpback chub in Cataract Canyon

II. Relationship to RIPRAP:

General Recovery Program Support Action Plan, V.A.1.
Colorado River Action Plan: Mainstem
V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).
V.C. Estimate humpback chub populations
V.C.3. Cataract Canyon

III. Study Background/Rationale and Hypotheses:

The Upper Colorado River Endangered Fish Recovery Program (UCRRP) has assisted Region 6 of the U.S. Fish and Wildlife Service (Service) in developing recovery goals for the four Colorado River endangered fishes, including the humpback chub (*Gila cypha*), Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), and bonytail (*Gila elegans*). Achievement of the recovery goals for humpback chub will be determined in part by monitoring the six known self-sustaining populations in the upper and lower Colorado River basins to ensure that each population is stable or increasing. These populations include Black Rocks, Westwater Canyon, Desolation/Gray Canyons, Yampa Canyon, Cataract Canyon, and Grand Canyon. The period of monitoring for downlisting is 5 years, in which at least three reliable population estimates will be taken for each of the six populations. The period of monitoring for delisting is 3 years beyond downlisting, in which at least one reliable population estimates will be taken for each of the six populations.

Sampling in Cataract Canyon began in 1979 under the Service's Colorado River Fishery Project (Valdez et al. 1981), then continued under the U.S. Bureau of Reclamation contracted studies with Bio/West (Valdez 1990). Starting in 1990, sampling has been conducted intermittently by the Utah Division of Wildlife Resources (UDWR). This sampling includes annual monitoring of the fish community in Cataract Canyon that was added to the Interagency Standardized Monitoring Program (ISMP) beginning in 1998. The catch rates observed during these studies were highly variable, and the population size could not be determined from these data.

A minimum of two sampling passes are required for a mark/recapture population estimate. However, it has been determined in previous studies conducted within and outside the UCRRP that three passes will provide a more precise estimate (Riley and Fausch 1992; Osmundson and Burnham 1996). Additional trips beyond three passes may provide a more precise estimate, but additional sampling increases effort and overall cost of the project. In mark/recapture population estimates, as in any statistical exercise, the larger the sample size, the more precise the estimate. The target number of fish captured in the first pass should be about 10-20% of the total estimated population. Sampling in 2003 produced probabilities of capture for humpback and bonytail chub between 8-10% on average. Unfortunately low overall numbers resulted in population estimates with coefficients of variation over 50%.

In an attempt to increase the number of recaptures and the precision of our population estimates, a new approach will be utilized in FY 2004. Densities will be estimated within three large scale habitats (i.e., a large eddy complex) within the previously sampled long-term trend sites. This would consist of five consecutive days of mark/recapture effort in one section (1/2 – 1/4 mile). Recaptures would be counted between days within a single trip. The underlying assumption is that chub mix back into the population within that habitat but do not leave the larger section within the sample period. This assumption is likely met within Cataract Canyon in the fall months. Our sampling in 2003 found many more recaptures between days within the same habitat, and recaptures of fish between trips showed no movement from their original capture section. The section densities could then be extrapolated throughout the canyon. This type of sampling should provide a greater number of recaptures and a more acceptable level of variation within the estimate.

This project provides further opportunity to relate the resulting population estimates over time to long-term catch rates that are generated under such protocols as those of the historic ISMP. This analysis is being conducted in conjunction with the humpback chub population estimates for Westwater Canyon and Desolation Canyon. Such analyses will provide important information to recovery program partners for monitoring this and other species outside the scope of the UCRRP.

IV. Goals, Objectives, End Product:

Goal:

1) Estimate the Cataract Canyon humpback chub population with the greatest precision possible (i.e., smallest confidence intervals possible).

2) Transport presumed wild bonytail (*Gila elegans*) to a hatchery.

Objectives:

1) To obtain a population estimate of late juvenile/adult humpback chub in Cataract Canyon.

2) To determine if a relationship exists between ISMP catch rates and population size.

End Product:

A precise population estimate of the Cataract Canyon humpback chub population.

V. Study area:

- Three long term trend sites in Cataract Canyon (RM 212-211, RM 208.5-207, RM 207-205).
- Three sampling trips will be made each year, in late September and October.
- Each trip will be 8 days in duration, including three travel/rig days.

VI. Study Methods/Approach:

Study methods will be similar to those used in the Westwater Canyon, Black Rocks, and Desolation/Gray Canyons population estimates, with a modification to the timing of recapture events. The study design will be a multiple mark/recapture model. Three sampling trips will be made in September and October for each of three years. Three primary sites will be sampled that were identified by previous studies as trend sites for long-term monitoring (RM 212-211, RM 208.5-207, RM 207-205). Humpback chub captures were greatest at these trend sites during a four year study from 1986-1989 (Valdez 1990). Few chubs were captured outside these areas because Cataract Canyon has a high proportion of large turbulent rapids and relatively little

humpback chub habitat compared to Westwater Canyon or Desolation/Gray Canyons. Cataract Canyon is 17 miles in length, from the confluence of the Green and Colorado rivers to 40' below the lake full level of Lake Powell (3700' amsl). The first 4 miles below the confluence, above all rapids, have been sampled by UDWR as part of the bonytail reintroduction monitoring and have not produced humpback chub. Of the remaining 13 miles, 6.2 are rapids, and cannot be effectively sampled. Of the remaining 7 miles between rapids, 4.5 miles are included in the sampling design as trend sites.

On each sampling trip, one trend site will be sampled. Sampling at each site will consist of five consecutive days of mark/ recapture effort in one section (1/2 – 1/4 mile). Recaptures will be counted between days within a single trip. A crew of seven people will be required on each pass.

Trammel nets and electrofishing will be used to capture juvenile and adult chubs. Chart and Lentsch (1999) found that adult chub >200 mm are better sampled with trammel nets, and juvenile chub are better sampled by electrofishing. Each site will be electrofished before nets are set. Electrofishing will be conducted using a boat-mounted unit, and will follow shorelines closely. At each site, six to eight nets will be set in the evening beginning at 1630 hrs and checked every 1.5 to 2 hours to 2230 hrs. Nets will be moved within the sample area as necessary. Nets will be set again in the morning and checked through mid-morning. All chubs will be processed immediately after capture and released near their capture location.

All chub species will be scanned for a PIT tag and tagged if one is not detected, measured (mm), and weighed (g). All humpback chub ≥150 mm total length (TL) will be PIT-tagged. In addition, bonytail have been stocked upstream in the Green and Colorado rivers by UDWR since 1996. All chub suspected of being stocked bonytail will be scanned for a coded wire tag if a PIT tag is not detected because it is possible that some stocked bonytail will be captured. All recaptured fish will be recorded, based on PIT tag number, but only those fish at large for more than 24 hours will be used in the population estimate.

A population estimate will be determined for each site and all sites combined for each year of the study. An attempt will be made to calibrate catch rate indices with abundance within trend sites. These catch rate indices will used to estimate abundances at elective sites. An estimate for Cataract Canyon as a whole will be extrapolated from the trend site estimates and applied to suitable habitat outside the trend sites. A statistician will be consulted to determine which population estimate model(s) best fit(s) the data (i.e., CAPTURE, White et al. 1982). Extrapolation of the data collected to the entire canyon will follow what is determined to be scientifically/statistically acceptable in the final results/conclusions of previous humpback chub population estimates (e.g. Westwater Canyon). Population estimates will be made each for adult humpback chub (i.e., fish >200 mm TL) and for subadults (i.e., fish 150-200 mm TL), in order to assess potential recruitment to the population.

Cataract Canyon is one of the last locations where wild bonytail have been captured (Valdez 1990). Thus, any wild bonytail captured in Cataract Canyon will be transported initially to Wahweap State Fish Hatchery (Wahweap) according to UCRRP protocol. Transfers to Wahweap will be done as soon as possible by a contracted helicopter that will be contacted by satellite phone immediately after capture. Transfer of bonytail from Wahweap to another hatchery facility, if necessary, will be coordinated with the Service.

VII. Task Description and Schedule:

NOTE: The start of this project was delayed from FY2002 to FY2003 due to low water conditions in Cataract in 2002 which prohibited sampling. Tasks for FY2003 are similar to those proposed for FY2004.

FY2004

Task 1) Complete three sampling trips in Cataract Canyon in late September/October 2004 for a humpback chub population estimate.

Task 2) Data will be entered into a database on the computer and transferred to the UCRRP database manager by January 15, 2005.

Task 3) An annual progress report detailing the data from the initial two years will be submitted in November 2004.

FY2005

Task 1) Complete three sampling trips in Cataract Canyon in late September/October 2005 for a humpback chub population estimate.

Task 2) Data will be entered into a database on the computer and transferred to the UCRRP database manager by January 15, 2006.

Task 3) An annual report detailing the data from all three years of the project will be submitted in November 2005.

VIII. FY2004 Work

Deliverables/Due Dates - See above

Budget:

A) UDWR - Moab Field Station

Task 1: Sampling

Labor-	Work days	Cost
Project Leader (405/day)	5	$2,025
Biologists (315/day)	68	$21,420
Technicians (180/day)	144	$25,920
Travel ($35/day/vehicle)	90	$3,150
Materials (food)		$2,500
Equipment (maintenance)		$2,000
Other (gas)		$1,000
Task 1 Subtotal		$58,015

Task 2: Data Entry

Labor-	Work days	Cost
Project Leader (405/day)	1	$405
Biologists (315/day)	4	$1,260
Technicians (180/day)	5	$900
Travel ($35/day/vehicle)	0	$0
Materials		$0
Equipment		$0
Other		$0
Task 2 Subtotal		$2,565

Task 3: Annual Reporting

Labor-	Work days	Cost
Project Leader (405/day)	3	$1,215
Biologists (315/day)	5	$1,575
Technicians (180/day)	0	$0
Travel ($35/day/vehicle)	0	$0
Materials		$0
Equipment		$0
Other		$0
Task 3 Subtotal		$2,790

UDWR - Moab Field Station FY2004 Total

Labor-	Work days	Cost
Project Leader (405/day)	9	$3,645
Biologists (315/day)	77	$24,255
Technicians (180/day)	149	$26,820
Travel ($35/day/vehicle)	90	$3,150
Materials		$2,500
Equipment		$2,000
Other		$1,000
UDWR-Moab Total		**$63,370**

B) R.A. Valdez and Assoc.

Task 1: Sampling

Labor-	Work days	Cost
R.A. Valdez (709/day)	8	$5,672
Travel (vehicle and hotel)		$210
Materials		$0
Equipment		$0
Other		$0
Task 1 Subtotal		$5,882

Task 2: Data Entry: N/A

Task 3: Annual Reporting

Labor-	Work days	Cost
R.A. Valdez (709/day)	3	$2,127
Travel		$0
Materials		$0
Equipment		$0
Other		$0
Task 3 Subtotal		$2,127

R.A. Valdez and Assoc. FY2004 Total

Labor-	Work days	Cost
R.A. Valdez (709/day)	11	$7,799
Travel		$210
Materials		$0
Equipment		$0
Other		$0
R.A. Valdez Total		**$8,009**

FY2004 UDWR Total	**$63,370**
FY2004 R.A. Valdez and Assoc. Total	**$ 8,009**
FY2004 Grand Total	**$71,379**

Note: Time and materials for transport of bonytail to a hatchery have not been included in this budget, since transport may not be necessary. Each transport occasion is estimated at $2,000.00.

FY2005 Work

Deliverables/Due Dates - See above

Budget:

A) UDWR - Moab Field Station

Task 1: Sampling

Labor-	Work days	Cost
Project Leader (425/day)	5	$2,125
Biologists (330/day)	68	$22,440
Technicians (180/day)	144	$25,920
Travel ($35/day/vehicle)	90	$3,150
Materials (food)		$2,500
Equipment (maintenance)		$2,000
Other (gas)		$1,000
Task 1 Subtotal		$59,135

Task 2: Data Entry

Labor-	Work days	Cost
Project Leader (425/day)	1	$425
Biologists (330/day)	4	$1,320
Technicians (180/day)	5	$900
Travel ($35/day/vehicle)	0	$0
Materials		$0
Equipment		$0
Other		$0
Task 2 Subtotal		$2,645

Task 3: Annual Reporting

Labor-	Work days	Cost
Project Leader (425/day)	3	$1,275
Biologists (330/day)	5	$1,650
Technicians (180/day)	0	$0
Travel ($35/day/vehicle)	0	$0
Materials		$0
Equipment		$0
Other		$0
Task 3 Subtotal		$2,925

UDWR - Moab Field Station FY2005 Total

Labor-	Work days	Cost
Project Leader (425/day)	9	$3,825
Biologists (330/day)	77	$25,410
Technicians (180/day)	149	$26,820
Travel ($35/day/vehicle)	90	$3,150
Materials		$2,500
Equipment		$2,000
Other		$1,000
UDWR-Moab Total		**$64,705**

B) R.A. Valdez and Assoc.

Task 1: Sampling

Labor-	Work days	Cost
R.A. Valdez (744/day)	8	$5,952
Travel (vehicle and hotel)		$210
Materials		$0
Equipment		$0
Other		$0
Task 1 Subtotal		$6,162

Task 2: Data Entry: N/A

Task 3: Annual Reporting

Labor-	Work days	Cost
R.A. Valdez (744/day)	3	$2,190
Travel		$0
Materials		$0
Equipment		$0
Other		$0
Task 3 Subtotal		$2,232

R.A. Valdez and Assoc. FY2005 Total

Labor-	Work days	Cost
R.A. Valdez (744/day)	11	$8,184
Travel		$210
Materials		$0
Equipment		$0
Other		$0
R.A. Valdez Total		**$8,394**

FY2005 UDWR Total	**$64,705**
FY2005 R.A. Valdez and Assoc. Total	**$ 8,394**
FY2005 Grand Total	**$73,099**

Note: Time and materials for transport of bonytail to a hatchery have not been included in this budget, since transport may not be necessary. Each transport occasion is estimated at $2,000.00.

IX. Budget Summary

FY-2004	$71,379
FY-2005	$73,099

X. Reviewers - Dr. Kevin Bestgen
Dr. Michael Douglas
Chuck McAda

XI. References

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